

## General

### Title

Excess days in acute care (EDAC): hospital-level, 30-day risk-standardized EDAC following heart failure (HF).

### Source(s)

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 condition-specific measure updates and specifications report: hospital-level 30-day risk-standardized excess days in acute care measures. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017 Mar. 61 p.

## Measure Domain

### Primary Measure Domain

Related Health Care Delivery Measures: Use of Services

### Secondary Measure Domain

Does not apply to this measure

## Brief Abstract

### Description

This measure assesses hospital-level, 30-day risk-standardized excess days in acute care (EDAC) for patients discharged from the hospital with a principal diagnosis of heart failure (HF). Days in acute care are defined as days spent in an emergency department (ED), admitted to observation status, or admitted as an unplanned readmission for any cause to a short-term acute care hospital.

The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for individuals who are 65 years and older and are Medicare Fee-for-Service (FFS) beneficiaries hospitalized in non-federal short-term acute care hospitals (including Indian Health Services hospitals) and critical access hospitals.

CMS calculates EDAC, for each hospital, as the difference ("excess") between a hospital's predicted days and expected days per 100 discharges. "Expected days" is the average number of risk-adjusted days in acute care a hospital's patients would have been expected to spend if discharged from an average performing hospital with the same case mix. "Predicted days" is the average number of days a hospital's

patients spent in acute care after adjusting for the risk factors (see Table D in the original measure documentation).

## Rationale

In the context of the publicly reported Center for Medicare & Medicaid Services (CMS) 30-day heart failure readmission measure, the increasing use of emergency department (ED) visits and observation stays has raised concerns that the current CMS 30-day heart failure readmission measure does not capture the full range of unplanned acute care in the post-discharge period. In particular, there exists concern that high use of observation stays could in some cases replace readmissions, and hospitals with high rates of observation stays in the post-discharge period may therefore have low readmission rates that do not accurately reflect the quality of care (Carlson, 2013). In response to these concerns, CMS has built a measure for heart failure that incorporates the full range of post-discharge use of acute care.

The goal of this measure is to improve patient care by providing patients, physicians, and hospitals with information about hospital-level, risk-standardized acute care use following hospitalization for heart failure. Measurement of patient outcomes allows for a broad view of quality of care that cannot be captured entirely by individual process-of-care measures. Safely transitioning patients from hospital to home requires a complex series of tasks which would be cumbersome to capture individually as process measures: timely and effective communication between providers, prevention of and response to complications, patient education about post-discharge care and self-management, timely follow-up, and more. Suboptimal transitions contribute to a variety of adverse outcomes post-discharge, including ED evaluation, need for observation, and readmission. Measures of unplanned readmission already exist, but there are no current measures for ED and observation stay utilization. It is thus difficult for providers and consumers to gain a complete picture of post-discharge outcomes. Moreover, separately reporting each outcome encourages "gaming," such as recategorizing readmission stays as observation stays to avoid a readmission outcome. By capturing a range of outcomes that are important to patients, CMS can produce a more complete picture of post-discharge outcomes that better informs consumers about care quality and incentivizes global improvement in transitional care.

## Evidence for Rationale

Carlson J. Faulty gauge? Readmissions are down, but observational-status patients are up and that could skew Medicare numbers. [internet]. Modern Healthcare; 2013 Jun 8.

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research & Evaluation (CORE). Excess days in acute care after hospitalization for heart failure (version 1.0): final measure methodology report. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2015 Aug. 57 p. [50 references]

## Primary Health Components

Heart failure (HF); 30-day excess days in acute care (EDAC)

## Denominator Description

The measure cohort consists of admissions for Medicare Fee-for-Service (FFS) beneficiaries aged 65 years or older and discharged from non-federal acute care hospitals and critical access hospitals, having a principal discharge diagnosis of heart failure (HF).

See the related "Denominator Inclusions/Exclusions" field.

Note: This outcome measure does not have a traditional numerator and denominator like a core process measure; thus, this field is used

to define the measure cohort.

See the [2017 Condition-specific Measures Updates and Specifications Report: Hospital-level 30-day Risk-standardized Excess Days in Acute Care Measures](#)  for more details.

## Numerator Description

This measure counts all-cause days in acute care within 30 days from the date of discharge from an index heart failure (HF) admission. Days in acute care are defined as days spent in an emergency department (ED), admitted to observation status, or admitted as an unplanned readmission for any cause to a short-term acute care hospital.

Each ED visit is counted as one half-day (0.5 days). Observation stays are recorded in terms of hours and converted for the measure into half-days (rounded up). A readmission is defined as any unplanned short-term acute care hospitalization within 30 days of the discharge date for the index admission. Each unplanned readmission is counted according to length of stay, which is calculated as the discharge date minus the admission date. Admissions that extend beyond the 30-day follow-up period are truncated on day 30. All eligible outcomes occurring in the 30-day period are counted, even if they are repeat occurrences.

See the related "Numerator Inclusions/Exclusions" field.

Note: This outcome measure does not have a traditional numerator and denominator like a core process measure; thus, this field is used to define the outcome.

See the [2017 Condition-specific Measures Updates and Specifications Report: Hospital-level 30-day Risk-standardized Excess Days in Acute Care Measures](#)  for more details.

## Evidence Supporting the Measure

### Type of Evidence Supporting the Criterion of Quality for the Measure

A systematic review of the clinical research literature (e.g., Cochrane Review)

One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

### Additional Information Supporting Need for the Measure

- Heart failure was the second most common principal discharge diagnosis among patients with Medicare in 2012 (Agency for Healthcare Research and Quality, n.d.) Heart failure also accounts for a large fraction of hospitalization costs and it was the third most expensive condition billed to Medicare in 2011 (Torio & Andrews, 2013).
- Patients admitted for heart failure have disproportionately high readmission rates. Readmission rates following discharge for heart failure are highly variable across hospitals in the United States (U.S.) (Krumholz et al., 2009; Bernheim et al., 2010). For the time period between July 2012 and June 2013, hospitals' 30-day risk-standardized readmission rates (RSRRs) for heart failure ranged from 17.0% to 28.2% (Yale New Haven Health Services Corporation [YNHHSC] & Center for Outcomes Research and Evaluation [CORE], 2014).
- Patients, however, are not only at risk of requiring rehospitalization in the post-discharge period. Emergency department (ED) visits represent a significant proportion of post-discharge acute care utilization. Two recent studies conducted in patients of all ages have shown that 9.5% of patients return to the ED within 30 days of hospital discharge and that about 12.0% of these patients are discharged from the ED and are not captured by the current Centers for Medicare & Medicaid Services (CMS) 30-day heart failure readmission measure (Rising et al., 2013; Vashi et al., 2013).
- Additionally, over the past decade, the use of observation stays has rapidly increased. Between 2001

and 2008, the use of observation services increased nearly three-fold (Venkatesh et al., 2011), and significant variation has been demonstrated in the use of observation services for conditions such as chest pain (Schoor et al., 2011). These rising rates of observation stays among Medicare beneficiaries have gained the attention of patients, providers, and policymakers (Feng, Wright, & Mor, 2012; Rising et al., 2013; Vashi et al., 2013). A report from the Office of the Inspector General (OIG) noted that in 2012, Medicare beneficiaries had 1.5 million observation stays. Many of these observation stays lasted longer than the intended one day. The OIG report also noted the potential relationship between hospital use of observation stays as an alternative to short-stay inpatient hospitalizations as a response to changing hospital payment incentives (Wright, 2013).

## Evidence for Additional Information Supporting Need for the Measure

Agency for Healthcare Research and Quality (AHRQ). HCUPnet. Healthcare Cost and Utilization Project. [Internet]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ);

Bernheim SM, Grady JN, Lin Z, Wang Y, Wang Y, Savage SV, Bhat KR, Ross JS, Desai MM, Merrill AR, Han LF, Rapp MT, Drye EE, Normand SL, Krumholz HM. National patterns of risk-standardized mortality and readmission for acute myocardial infarction and heart failure. Update on publicly reported outcomes measures based on the 2010 release. *Circ Cardiovasc Qual Outcomes*. 2010 Sep;3(5):459-67. [PubMed](#)

Feng Z, Wright B, Mor V. Sharp rise in Medicare enrollees being held in hospitals for observation raises concerns about causes and consequences. *Health Aff (Millwood)*. 2012 Jun;31(6):1251-9. [PubMed](#)

Krumholz HM, Merrill AR, Schone EM, Schreiner GC, Chen J, Bradley EH, Wang Y, Wang Y, Lin Z, Straube BM, Rapp MT, Normand SL, Drye EE. Patterns of hospital performance in acute myocardial infarction and heart failure 30-day mortality and readmission. *Circ Cardiovasc Qual Outcomes*. 2009 Sep;2(5):407-13. [PubMed](#)

Rising KL, White LF, Fernandez WG, Boutwell AE. Emergency department visits after hospital discharge: a missing part of the equation. *Ann Emerg Med*. 2013 Aug;62(2):145-50. [PubMed](#)

Schoor JD, Baugh CW, Hess EP, Hilton JA, Pines JM, Asplin BR. Critical pathways for post-emergency outpatient diagnosis and treatment: tools to improve the value of emergency care. *Acad Emerg Med*. 2011 Jun;18(6):e52-63. [PubMed](#)

Torio CM, Andrews RM. National inpatient hospital costs: the most expensive conditions by payer, 2011. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2013 Aug. 12 p. (HCUP statistical brief; no. 160).

Vashi AA, Fox JP, Carr BG, D'Onofrio G, Pines JM, Ross JS, Gross CP. Use of hospital-based acute care among patients recently discharged from the hospital. *JAMA*. 2013 Jan 23;309(4):364-71. [PubMed](#)

Venkatesh AK, Geisler BP, Gibson Chambers JJ, Baugh CW, Bohan JS, Schoor JD. Use of observation care in US emergency departments, 2001 to 2008. *PLoS ONE*. 2011;6(9):e24326. [PubMed](#)

Wright S. Hospitals' use of observation stays and short inpatient stays for Medicare beneficiaries. Washington (DC): Department of Health and Human Services; 2013 Jul 29. 20 p.

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research & Evaluation (CORE). Excess days in acute care after hospitalization for heart failure (version 1.0): final measure methodology report. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2015 Aug. 57 p. [50 references]

## Extent of Measure Testing

### Assessment of Updated Models

The heart failure (HF) excess days of acute care (EDAC) measure estimates hospital-specific 30-day all-cause EDAC using a hierarchical generalized linear model. Refer to Section 2 in the original measure documentation for a summary of the measure methodology and model risk-adjustment variables. Refer to prior methodology reports for further details.

The Centers for Medicare & Medicaid Services (CMS) evaluated and validated the performance of the model using July 2013 to June 2016 data for the 2017 reporting period. They also evaluated the stability of the risk-adjustment model over the three-year measurement period by examining the model variable frequencies in each year.

CMS assessed the overall fit of the model using posterior predictive checking (PPC) for the three-year combined period. For the logit model of zero versus non-zero days, which includes all patients in the cohort, they calculated the c-statistic. For the truncated Poisson model of non-zero days, which includes only patients with some acute care, they calculated the deviance  $R^2$ . The deviance  $R^2$  is computed from the difference in the log-likelihoods between the final model and an empty model (no covariates) attributed to each observation, averaged over all observations (Cameron & Windmeijer, 1996).

The results of these analyses are presented in Section 4.3 of the original measure documentation.

### HF EDAC 2017 Model Results

#### *Frequency of HF Model Variables*

CMS examined the change in the frequencies of clinical and demographic variables. Frequencies of model variables were quite stable over the measurement period. The largest changes in the frequencies (those greater than 2% absolute change) include:

Increases in asthma (10.1% to 13.3%), cardio-respiratory failure and shock (29.9% to 33.7%), other psychiatric disorders (21.1% to 23.6%), and renal failure (62.8% to 65.0%)

A decrease in other urinary tract disorders (30.9% to 28.5%)

#### *HF Model Parameters and Performance*

Table 4.3.2 in the original measure documentation shows the parameter estimates and 95% credible intervals (CIs) for the combined three-year dataset. Table 4.3.3 in the original measure documentation shows the PPC results for the combined three-year dataset. The c-statistic for the logit part was 0.60. The deviance  $R^2$  for the truncated Poisson part was 0.029.

Refer to the original measure documentation for additional information.

## Evidence for Extent of Measure Testing

Cameron AC, Windmeijer FA. R-squared measures for count data regression models with applications to health-care utilization. J Bus Econ Stat. 1996 Apr;14(2):209-20.

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 condition-specific measure updates and specifications report: hospital-level 30-day risk-standardized excess days in acute care measures. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017 Mar. 61 p.

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## State of Use of the Measure

### State of Use

Current routine use

### Current Use

not defined yet

## Application of the Measure in its Current Use

### Measurement Setting

Hospital Inpatient

### Professionals Involved in Delivery of Health Services

not defined yet

### Least Aggregated Level of Services Delivery Addressed

Single Health Care Delivery or Public Health Organizations

### Statement of Acceptable Minimum Sample Size

Specified

### Target Population Age

Age greater than or equal to 65 years

### Target Population Gender

Either male or female

## National Strategy for Quality Improvement in Health Care

### National Quality Strategy Priority

## Institute of Medicine (IOM) National Health Care Quality

# Report Categories

## IOM Care Need

Not within an IOM Care Need

## IOM Domain

Not within an IOM Domain

# Data Collection for the Measure

## Case Finding Period

Discharges July 1, 2013 to June 30, 2016

## Denominator Sampling Frame

Patients associated with provider

## Denominator (Index) Event or Characteristic

Clinical Condition

Institutionalization

Patient/Individual (Consumer) Characteristic

## Denominator Time Window

not defined yet

## Denominator Inclusions/Exclusions

### Inclusions

An *index* admission is the hospitalization to which the excess days in acute care (EDAC) outcome is attributed and includes admissions for patients:

- Having a principal discharge diagnosis of heart failure (HF)\*
- Enrolled in Medicare Fee-for-Service (FFS) Part A and Part B for the 12 months prior to the date of admission, and enrolled in Part A during the index admission
- Aged 65 or over
- Discharged alive from a non-federal short-term acute care hospital
- Not transferred to another acute care facility

\*International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) codes used to define the HF cohort for discharges on or after October 1, 2015:

- I11.0 Hypertensive heart disease with heart failure
- I13.0 Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease
- I13.2 Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal

disease  
I50.1 Left ventricular failure  
I50.20 Unspecified systolic (congestive) heart failure  
I50.21 Acute systolic (congestive) heart failure  
I50.22 Chronic systolic (congestive) heart failure  
I50.23 Acute on chronic systolic (congestive) heart failure  
I50.30 Unspecified diastolic (congestive) heart failure  
I50.31 Acute diastolic (congestive) heart failure  
I50.32 Chronic diastolic (congestive) heart failure  
I50.33 Acute on chronic diastolic (congestive) heart failure  
I50.40 Unspecified combined systolic (congestive) and diastolic (congestive) heart failure  
I50.41 Acute combined systolic (congestive) and diastolic (congestive) heart failure  
I50.42 Chronic combined systolic (congestive) and diastolic (congestive) heart failure  
I50.43 Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure  
I50.9 Heart failure, unspecified

Note: International Classification of Diseases, Ninth Revision (ICD-9) code lists for discharges prior to October 1, 2015 can be found in the [Excess Days in Acute Care after Hospitalization for Heart Failure \(Version 1.1\): Updated Measure Methodology Report](#).

## Exclusions

Without at least 30 days of post-discharge enrollment in Medicare FFS  
Discharged against medical advice  
HF admissions within 30 days of discharge from a prior HF index admission  
With a procedure code for left ventricular assist device (LVAD) implantation or heart transplantation either during the index admission or in the 12 months prior to the index admission

## Exclusions/Exceptions

not defined yet

## Numerator Inclusions/Exclusions

### Inclusions

All-cause days in acute care within 30 days from the date of discharge from an index heart failure (HF) admission

Days in acute care are defined as days spent in an emergency department (ED), admitted to observation status, or admitted as an unplanned readmission for any cause within 30 days from the date of discharge from the index admission.

Each ED visit is counted as one half-day (0.5 days).

Observation stays are recorded in terms of hours and converted for the measure into half-days (rounded up).

The Centers for Medicare & Medicaid Services (CMS) defines a readmission as any unplanned acute care hospital inpatient hospitalization within 30 days of the discharge date for the index hospitalization. "Planned" readmissions are those planned by providers for anticipated medical treatment or procedures that must be provided in the inpatient setting. To exclude planned readmissions, use the planned readmission algorithm previously developed for the publicly reported CMS 30-day HF readmission measure (see Appendix E in the original measure documentation). Each rehospitalization is counted according to the length of stay, which is calculated as the discharge date minus the admission date. Admissions that extend beyond the 30-day follow-up period are truncated on day 30.

When an ED visit, observation stay, or readmission overlaps with another event on the same day, only the most severe of the overlapping events is counted.

Because some patients do not survive 30 days, not all patients are at risk for an acute event for the same amount of time. "Exposure time" is calculated as the number of days each patient survived after discharge, up to 30. This exposure time was incorporated as part of the outcome to reflect differential risk for EDAC after discharge. This differs from the existing CMS HF 30-day readmission measures, which consider all patients to be equally at risk for a hospital event regardless of survival time.



Note: This outcome measure does not have a traditional numerator and denominator like a core process measure; thus, this field is used to define the outcome.

See the [2017 Condition-specific Measures Updates and Specifications Report: Hospital-level 30-day Risk-standardized Excess Days in Acute Care Measures](#)  for more details.

## Exclusions

Admissions identified as planned by the planned readmissions algorithm are not counted. The planned readmission algorithm is a set of criteria for classifying readmissions and planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital.

The planned readmission algorithm has three fundamental principles:

- A few specific, limited types of care are always considered planned (transplant surgery, maintenance chemotherapy/immunotherapy, rehabilitation);

- Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and

- Admissions for acute illness or for complications of care are never planned.

The planned readmission algorithm uses a flow chart and four tables of specific procedure categories and discharge diagnosis categories to classify readmissions as planned. The flow chart and tables are available in the original measure documentation.

## Numerator Search Strategy

Fixed time period or point in time

## Data Source

Administrative clinical data

## Type of Health State

Proxy for Outcome

## Instruments Used and/or Associated with the Measure

Planned Readmission Algorithm Version 4.0 (ICD-10) Flowchart

## Computation of the Measure

## Measure Specifies Disaggregation

Does not apply to this measure

## Scoring

Count

## Interpretation of Score

Desired value is a lower score

## Allowance for Patient or Population Factors

not defined yet

## Description of Allowance for Patient or Population Factors

### Risk-Adjustment Variables

In order to account for differences in case mix among hospitals, the measure adjusts for variables (for example, age, comorbid diseases, and indicators of patient frailty) that are clinically relevant and have relationships with the outcome. For each patient, risk-adjustment variables are obtained from inpatient, outpatient, and physician Medicare administrative claims data extending 12 months prior to, and including, the index admission.

The measure adjusts for case mix differences among hospitals based on the clinical status of the patient at the time of the index admission. Accordingly, only comorbidities that convey information about the patient at that time or in the 12 months prior, and not complications that arise during the course of the hospitalization, are included in the risk adjustment.

The measure does not adjust for socioeconomic status (SES) because the association between SES and health outcomes can be due, in part, to differences in the quality of healthcare that groups of patients with varying SES receive. The intent is for the measure to adjust for patient demographic and clinical characteristics while illuminating important quality differences. As part of the National Quality Forum's (NQF's) endorsement process for this measure, the Centers for Medicare & Medicaid Services (CMS) completed analyses for the two-year Sociodemographic Trial Period. Although univariate analyses found that the patient-level observed days in acute care is higher for dual-eligible patients (for patients living in lower Agency for Healthcare Research and Quality [AHRQ] SES Index census block groups) and African-American patients compared with all other patients, analyses in the context of a multivariable model demonstrated that the effect size of these variables was small, and that the c-statistics for the for the logit part of the models and the deviance  $R^2$  values for the Poisson part of the models are similar with and without the addition of these variables.

Refer to Appendix D of the original measure documentation for the list of comorbidity risk-adjustment variables and the list of complications that are excluded from risk adjustment if they occur only during the index admission.

## Standard of Comparison

not defined yet

## Identifying Information

### Original Title

Hospital-level 30-day EDAC following HF.

### Measure Collection Name

National Hospital Inpatient Quality Measures

### Measure Set Name

## Submitter

Centers for Medicare & Medicaid Services - Federal Government Agency [U.S.]

## Developer

Centers for Medicare & Medicaid Services - Federal Government Agency [U.S.]

Yale-New Haven Health Services Corporation/Center for Outcomes Research and Evaluation under contract to Centers for Medicare & Medicaid Services - Academic Affiliated Research Institute

## Funding Source(s)

Centers for Medicare & Medicaid Services (CMS)

## Composition of the Group that Developed the Measure

This measure was developed by a team of experts:

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## Financial Disclosures/Other Potential Conflicts of Interest

None

## Endorser

National Quality Forum - None

## NQF Number

not defined yet

## Date of Endorsement

2016 Dec 9

## Core Quality Measures

Does not apply to this measure

## Measure Initiative(s)

Hospital Compare

Hospital Inpatient Quality Reporting Program

## Adaptation

This measure was not adapted from another source.

## Date of Most Current Version in NQMC

2017 Mar

## Measure Maintenance

## Date of Next Anticipated Revision

2018 May

## Measure Status

This is the current release of the measure.

## Measure Availability

Source available from the [QualityNet Web site](#) .

Check the QualityNet Web site regularly for the most recent version of the specifications manual and for the applicable dates of discharge.

## Companion Documents

The following are available:

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research & Evaluation (CORE). Excess days in acute care after hospitalization for heart failure (HF) (version 1.0): final measure methodology report. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2015 Aug. 57 p. Available from the [QualityNet Web site](#) .

Hospital compare: a quality tool provided by Medicare. [internet]. Washington (DC): U.S. Department of Health and Human Services; [accessed 2017 Oct 3]. This is available from the [Medicare Web site](#) .

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). Medicare hospital quality chartbook: performance report on outcome measures. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017. Available from the [Centers for Medicare & Medicaid Services \(CMS\) Web site](#) .

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 condition-specific EDAC measures updates and specifications report: supplemental ICD-10 code lists for use with claims for discharges on or after October 1, 2015. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017. Available from the [QualityNet Web site](#) .

## NQMC Status

This NQMC summary was completed by ECRI Institute on December 29, 2017. The information was verified by the measure developer on January 17, 2018.

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No copyright restrictions apply.

## Production

Source(s)

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